REMARKS

Claims 1, 15-17, 43, 63, 65, 67, 69, 81, 82, 86, 222, 253, 254, 313-319, 344, 351-353, 355, 356, 360, 368-371, and 391 are amended, claims 13, 14, 364, and 375 are canceled. Claims 1, 15-28, 31-35, 37-52, 55-63, 65-67, 69-75, 79-108, 110-256, 272, 309, 313-359, 361, 362, 365-373, and 376-392 are currently pending in the case. Claims 15-28, 31-35, 37-52, 55-63, 65, 66, 69-71, 84-87, 90-93, 98-102, 104, 106-108, 113-125, 132-179, 183-216, 218-234, 236-250, 253-256, 272, 309, 316, 321, 322, 325-342, 345-350, 357-359, 366, 367, 377, 379, 386-390, and 392 remain withdrawn. Further examination and reconsideration of the presently claimed application are respectfully requested.

Interview Summary

A telephonic interview was conducted between Examiner Sheridan Swope, C. Steven McDaniel, Melinda Wales, Jonathan Hurt, and Mollie Lettang on August 14, 2008 to discuss the captioned case. Reasons and clarification as to why Examiner Swope believes the specification does not provide enablement and written description for the claims rejected under 35 U.S.C. § 112, first paragraph (particularly claim 1) were discussed. In addition, possible amendments for overcoming the enablement and written description rejections were discussed, but no principal proposed amendments of a substantive nature were expressed. Moreover, the obvious-type rejection of the claims with reference to Bonaventura and Cheng in the Office Action (particularly claim 1) was discussed. No other pertinent matters to the case were discussed and no agreement regarding the rejections of the claims was reached. There was no exhibit shown or demonstration conducted.

Reinstatement of Previously Withdrawn Claims

Previously withdrawn claims 181, 182, 313-315, 317, 318, 320, 355, 356, 360-362, 371-373 and 378 have been reinstated for examination. On page 2 of the Office Action, the Examiner states claims 181, 182, and 320 should be listed as "Previously Presented" and, thus, the claims have been reinstated for examination. As will be explained in more detail below with

regard to the objection to claims 181, 182, and 320, claim 378 has been reinstated for being a Markush-type claim and including elected subject matter (i.e., paint).

As noted in a response to the Office Action mailed May 18, 2007, previously withdrawn claims 313-315, 317, 318, 360-362, and 371-373 were inadvertently withdrawn in a response to a previous Office Action because they were mistakenly believed to be directed at non-elected subject matter. However, upon review of the restriction requirement dated June 20, 2005, it was discovered that the subject matter of an elastomer, a filler, an adhesive, a textile material, and a wax have not been restricted. In addition, it was discovered that subject matter capable of catalyzing the hydrolysis of multiple organophosphorus compounds, particularly one or more organophosphorus chemical warfare agents and/or one or more organophosphorus pesticides, has not been restricted. In the most recent Office Action, the Examiner failed to acknowledge the reinstatement of claims 313-315, 317, 318, 360-362, and 371-373 and states such claims are withdrawn. Similarly, the Examiner states claims 355 and 356 are withdrawn, but the claims are not directed at non-elected subject matter and, thus, such a classification of the claims is traversed. The Examiner is respectfully requested to review the restriction requirement dated June 20, 2005 as well as claims 313-315, 317, 318, 355, 356, 360-362, and 371-373. Upon confirmation that the subject matter of the claims has indeed not been restricted, acknowledgement of their reinstatement is requested. If the Examiner disagrees with the reinstatement of the claims, reasons for such speculation are requested.

Objection to Information Disclosure Statements

Objections made in previous Office Actions mailed January 12, 2006 and May 18, 2007 to the Information Disclosure Statement (IDS) filed on 11/23/04 have been maintained in the current Office Action. It is noted that the objection in the Office Action mailed January 12, 2006 was properly addressed in the response filed July 12, 2006, particularly by filing, in conjunction with the response, a new IDS properly citing the published U.S. patents and patent application included in the IDS filed on 11/23/04. In addition, the response noted that the Applicant was diligently working on compiling information to properly cite the non-patent references included in the IDS filed on 11/23/04. IDSs citing such non-patent references were indeed filed in due

course on 9/27/06 and 11/8/06. The IDSs filed on 7/12/06, 9/27/06, and 11/8/06 were not acknowledged in the Office Action mailed May 18, 2007 and the objection to the IDS filed 11/23/04 was maintained. In the present Office Action:

- The Examiner acknowledges the IDS filed 7/12/06 and states the U.S. patents are correctly cited, but objects to the IDS for the following reasons: (1) Citation for non-patent document 1 is improper and (2) None of the foreign documents or non-patent documents have been provided. A reply to this objection is set forth below.

- The Examiner appears to acknowledge the IDS filed 9/27/06 (it is presumed that the Examiner's reference to the IDS filed September 27, 2007 on page 3 of the Office Action was a typographical error) and states some of the non-patent documents cited therein are correctly cited.

- The Examiner does not acknowledge the IDS filed 11/8/06.

Subsequent to the mailing of the captioned Office Action, a communication was mailed on March 14, 2008 in which the IDSs filed on 12/16/04, 7/12/06, 9/27/06, 11/8/06, and 1/8/08 were acknowledged. According to the communication, all of the references cited in the IDS filed 12/16/04 have been considered. (It is noted that the IDS filed 12/16/04 was previously objected to in the Office Actions mailed January 12, 2006 and May 18, 2007 for being incomplete or improper, but the objection appears to be withdrawn since the Examiner has signed off on all references cited on the PTO-1449 form filed on 12/16/04.) All U.S. Patent and U.S. Patent Applications have been considered for the IDS filed 7/12/06, but none of the foreign or non-patent literature cited therein were considered presumably for the reasons noted in the captioned Office Action. Abiding by the notations made in the captioned Office Action, some of the documents cited in the IDS filed 9/27/06 have been considered and others have not. None of the references cited in the IDS filed 11/8/06 have been considered, but all of the references cited in the IDS filed 1/8/08 have been considered.

On April 1, 2008, Examiner Swope was contacted by Patent Agent Mollie Lettang to discuss the reasons certain references were not considered in the IDSs filed 7/12/06, 9/27/06, and 11/8/06. During the telephone conversation, the image file wrapper for the case was reviewed via the PAIR system and Examiner Swope conceded that copies of the foreign documents and non-patent documents cited the IDS filed 7/12/06 were indeed filed with the IDS. With respect to the objection to non-patent document 1 being improperly cited in the IDS filed 7/12/06, Examiner Swope indicated that names of the inventors for the reference need to be identified in the IDS. Applicants respectfully disagree and cite 37 CFR 1.98(b)(4) for support. In particular, reference of foreign patents and foreign patent applications on IDS forms do not need to include inventor's names. Consequently, the IDS filed on 7/12/06 was filed properly. Removal of the objection to the IDS filed on 7/12/06 is respectfully requested. In addition, Examiner Swope is respectfully requested to consider the foreign documents and non-patent documents submitted in the IDS filed 7/12/06 and return the form initialized or indicate in some other way that the references cited therein have been considered.

With regard to the references deemed improperly cited in the IDS filed 9/27/06, Examiner Swope stated in the telephone conference that a publisher for the ASTM D references and page numbers for the Bell reference need to be noted. In response thereto, a new IDS is filed concurrently with this response, which lists a publisher for the ASTM D references and page numbers for the Bell reference. Examiner Swope is respectfully requested to consider the references submitted in the new IDS and return the form initialized or indicate in some other way that the references cited therein have been considered.

With regard to the references deemed improperly cited in the IDS filed 11/8/06, Examiner Swope stated in the telephone conference that an author and specific page numbers for each reference needs to be noted. In response thereto, is noted that document 1 does list page numbers 68-70. As one can see upon reviewing documents 2-5, none of such references include specific page numbers and, thus, they cannot be listed. It is noted that the total number of pages for each of documents 2-5 is listed. Documents 5 and 6 cite authors and, thus, Winkoski and DeFrank are listed, respectively, for those documents. Documents 1-4, however, do not cite authors and, therefore, they cannot be listed. In view thereof, it is believed the IDS filed on

11/8/06 was filed properly. Examiner Swope is respectfully requested to consider the documents submitted in the IDS filed 11/8/06 and return the form initialized or indicate in some other way that the references cited therein have been considered.

Objection to the Claims

The objection made in a previous Office Action mailed May 18, 2007 to claims 181, 182, and 320 for reciting non-elected subject matter have been maintained in the current Office Action. It is noted that the objection was addressed in a response filed November 19, 2007, particularly by noting that the claims were withdrawn in a previous response filed July 12, 2006 to expedite prosecution. In response thereto, the Examiner states that the Applicant does not have the authority to withdraw claims and any claim encompassing elected subject matter must be examined, if only in part, and, thus, the objection of claims 181, 182, and 320 is maintained (Office Action, pages 3 and 4). Applicant challenges the Examiner's assertion that the Applicant does not have the authority to withdraw claims reciting non-elected subject matter from consideration and respectfully requests citation of a rule that states only Examiners are allowed to withdraw claims. Furthermore, Applicant traverses the Examiner's objection to the claims. Claims 181, 182, and 320 are each a Markush-type claim and according to MPEP 803.2, Markush-type claims may include elected and non-elected subject matter and further must be examined at least with regard to the elected subject matter and, thus, are not required to be canceled or amended to remove non-elected subject matter. Consequently, an objection to such claims is not proper.

> A Markush-type claim may include independent and distinct inventions. This is true where two or more of the members are so unrelated and diverse that a prior art reference anticipating the claim with respect to one of the members would not render the claim obvious under 35 U.S.C. 103 with respect to the other member(s). In applications containing a Markush-type claim that encompasses at least two independent or distinct inventions, the examiner may require a provisional election of a single species prior to examination on the merits. … Following election, the Markush-type claim will be examined fully with respect to the elected species and further to the extent necessary to determine patentability. *MPEP 803.2*

As such, removal of the objection to claims 181, 182, and 320 is respectfully requested.

Section 112, 1st Paragraph, Rejections

Claims 1, 67, 68, 72-75, 79-83, 88, 89, 94-97, 103, 105, 110-112, 126-131, 180-182, 217, 251, 252, 319, 320, 323, 324, 343, 344, 351-354, 365, 368-370, 376, 380-385, and 391 were rejected under 35 U.S.C. § 112, first paragraph, for the specification failing to provide enablement for the subject matter of the claims. In addition, such claims were further rejected under 35 U.S.C. § 112, first paragraph, for containing subject matter which was not described in the specification in such a way to reasonably convey to one skilled in the art that the inventors had possession of the claimed invention. As set forth below, the rejections are traversed.

In an effort to expedite prosecution, the claims of the captioned case were amended in a response to a previous Office Action mailed May 18, 2007 with a limitation which the Examiner acknowledged as being enabled and supported by the written description of the specification, particularly that the claimed coatings comprise an enzymatically active organophospho hydrolase (see page 6, lines 5-6 of the Office Action mailed May 18, 2007). In the present Office Action, the Examiner acknowledges such a statement is made, but states such enablement and written description is limited to Examples 3-5 disclosed in the specification. Applicants respectfully disagree. It is noted that the claim amendments made in the response to the Office Action mailed May 18, 2007 with regard to the recitation of "an enzymatically active organophospho hydrolase" were made to specifically recite verbatim the limitation which the Examiner acknowledged as being enabled and supported by the written description of the specification in an effort to expedite prosecution. The Examiner, however, rejects the term "organophospho" in the present Office Action with regard to the 35 U.S.C. § 112, first paragraph written description requirement. To clarify their scope, the claims of the case have been amended to recite "an enzymatically active esterase classified in an enzyme subclass designated by Enzyme Commission number EC 3.1.8". Support for the amendment may be found throughout the specification, including but not limited to paragraph [0129].

On pages 5 and 6 of the Office Action, the Examiner states:

"The specification does not support the broad scope of the instant claims because the specification does not establish:

(A) all proteins having the desired organophosphorus hydrolase activity;

(B) regions of the protein structure which may be modified without affecting the organophosphorus hydrolase activity;

(C) the general tolerance of the organophosphorus hydrolase activity to modification and extent of such tolerance;

(D) a rational and predictable scheme for modifying any residues with an expectation of obtaining the desired biological function; and

(E) the specification provides insufficient guidance as to which of the essentially infinite possible choices is likely to be successful."

Applicant respectfully disagrees with such assertions as set forth in more detail below.

With regard to argument (A), all proteins of which the inventors were aware at the time of filing having the desired activity of enzyme commission number EC 3.1.8 are disclosed in the specification and are described in detail, particularly in paragraphs [0129] to [0153], [0168] to [0191], [0202], [0205], [0213], [0215], [0216], [0226], [0236], [0237], [0239], [0240], [0676], [0688], and [0718].

To delineate the phosphoric triester hydrolases (EC 3.1.8), the subcategory of the aryldialkylphosphatases (EC 3.1.8.1) is described at paragraphs [0140] to [0146]. Paragraphs [0140] to [0144] specifically disclose organophosphorus hydrolase (e.g., *Agrobacterium radiobacter* P230 organophosphate hydrolase, *Flavobacterium balustinum* parathion hydrolase, *Pseudomonas diminuta* phosphotriesterase, *Flavobacterium sp opd* gene product, and *Flavobacterium sp*. parathion hydrolase *opd* gene product). In paragraphs [0145] and [0146], human paraoxonase (e.g., HPON1 gene product) and animal carboxylases (e.g., *Plodia interpunctella* carboxylase, *Chrysomya putoria* carboxylase, *Lucilia cuprina* carboxylase, *Musca domestica* carboxylase) are disclosed, respectively.

To further delineate the phosphoric triester hydrolases (EC 3.1.8), the subcategory of diisopropyl-fluorophosphatase (EC 3.1.8.2) are described in paragraphs [0147] to [0153]. Paragraphs [0147] and [0148] specifically disclose organophosphorus acid anhydrolases (e.g.,

Altermonas organophosphorus acid anhydrolase comprises *Alteromonas* sp JD6.5 organophosphorus acid anhydrolase, *Alteromonas haloplanktis* organophosphorus acid anhydrolase, *Altermonas undina* organophosphorus acid anhydrolase). Prolidase (e.g., human prolidase, *Mus musculus* prolidase, *Lactobacillus helveticus* prolidase, *Escherichia coli* prolidase, *Escherichia coli* aminopeptidase P) is described in paragraph [0150] and squid-type DFPAase (e.g., *Loligo vulgaris* DFPase, *Loligo pealei* DFPase, *Loligo opalescens* DFPase) is described in paragraphs [0150] to [0151]. Paragraph [0152] describes Mazur-Type DFPase (e.g., mouse liver DFPase, hog kidney DFPase, *Bacillus stearothermophilus* strain OT DFPase, *Escherichia coli* DFPase) and paragraph [0153) describes additional phosphoric trimester hydrolases (e.g., *Plesiomonas* sp. strain M6 *mpd* gene product, *Xanthomonas sp*. phosphoric triester hydrolase, and *Tetrahymena* phosphoric triester hydrolase).

With regard to arguments (B), (C), (D), and (E), which the Applicant finds related to variations in enzymes that retain catalytic activity and are classified to the categories noted above, the specification provides ample teaching and guidance to modifications for producing catalytically active variations in enzyme sequence and structure. For example, paragraph [0143] references the crystal structure of *Pseudomonas* OPH, and describes structural analogues where active site metal ions are substituted to alter activity. Paragraph [0158] describes "… residues at or near the active site … contribute to a chemical reaction … to produce enzymatic activity …". Furthermore, paragraphs [0159] to [0162] and [0170] to [0171] describe identification techniques (e.g., chemical reaction, mutation, X-ray crystallography, NMR, computer based modeling) for an amino acid whose alteration would alter enzymatic activity (e.g., OPH amino acids His55, His57, His 201, His230, Asp301, Lys169, Asp232, Asp233, Asp235, Asp253, His354, His254, His257, Trp131, Phe132, Leu271, Phe306, Tyr309, Gly60, Ile106, Leu303, Ser308, Cys59, Ser61, Met317; and corresponding amino acids by comparison to *Agrobacterium radiobacter* p230 OPH).

Moreover, paragraph [0163] describes replacing an identified amino acid with conservative substitutions (e.g., "… replacing an amino acid side chain with one similar in charge … hydrophobicity … shape … size … chemical type …") as well as the guidance of amino acid substitutions via the hydropathic index and hydrophilicity values of amino acids

(e.g., "an amino acid is being conservatively substituted … the difference is preferably within +/- 2 …"). In addition, paragraph [0163] conversely teaches the use of non-conservative amino acid side chain substitutions, based on an identified amino acid of interest, to produce functional equivalents. Furthermore, paragraphs [0172] to [0181] teach specific OPH sequence analogues that produce catalytically active enzymes classified in EC 3.1.8 (e.g,. H55C, H57C, C59A, G60A, S61A, I106A, I106G, W131A, W131F, W131K, F132A, F132H, F132Y, L136Y, L140Y, H201C, H230C, H254A, H254R, H254S, H257A, H257L, H257Y, L271A, L271Y, L303A, F306A, F306E, F306H, F306K, F306Y, S308A, S308G, Y309A, M317A, M317H, M317K, M317R, H55C/H57C, H55C/H201C, H55C/H230C, H57C/H201C, H57C/H230C, A80V/S365P, I106A/F132A, I106A/S308A, I106G/F132G, I106G/S308G, F132Y/F306H, F132H/F306H, F132H/F306Y, F132Y/F306Y, F132A/S308A, F132G/S308G, L182S/V310A, H201C/H230C, H254R/H257L, H55C/H57C/H201C, H55C/H57C/H230C, H55C/H201C/H230C, I106A/F132A/H257Y, I106A/F132A/H257W, I106G/F132G/S308G, L130M/H257Y/I274N, H257Y/I274N/S365P, H55C/H57C/H201C/H230C, I106G/F132G/H257Y/S308G, or A14T/A80V/L185R/H257Y/I274N).

Paragraph [0164] describes chemical alterations that may be used to modify an amino acid to produce functional equivalents, and paragraphs [0165] to [0167] describe production of longer or shorter amino acid sequences (e.g., removal of an N-terminus amino acid sequence from OPH to enhance production in *Escherichia coli*) to produce enzymes retaining activity. The specification further provides numerous additional examples of these types of modifications to produce active enzymes, including active site metal ion substitutions (e.g., Co^{2+}, Fe^{2+}, Cu^{2+}, Mn^{2+}, Cd^{2+},or Ni^{2+} at) of OPH at paragraph [0169]. Moreover, the specification teaches combinations of metal ion substitutions with sequence analogues in paragraph [0173] and [0174] as well as removal of terminus sequences and adding peptide sequences (e.g., fusion proteins) and/or OPH sequence analogues in paragraphs [0182] to [0186].

Further examples of producing enzymes within subclass EC 3.1.8 having such modifications are disclosed in the specification, such as the identification of paroxonase amino acids involved in enzymatic activity (e.g., E32A, E48A, E52A, D53A, D88A, D107A, H114N, D121A, H133N, H154N, H160N, W193A, W193F, W201A, W201F, H242N, H245N, H250N,

W253A, W253F, D273A, W280A, W280F, H284N, H347N) via chemical modification of enzymes, cross species sequence comparisons, and site directed mutagenesis in paragraphs [0187] to [0188]. In addition, the identification of Squid-type DFPase amino acids involved in enzymatic activity (e.g., H181N, H224N, H274N, H219N, H248N, or H287N) is described in paragraphs [0189] to [0191]. Techniques for additional terminal sequence truncations and additions (e.g., fusion proteins) are described in paragraphs [211] to [0231], with numerous examples provided (e.g., fusion proteins, tags, fusion partners) in paragraphs [202], [0213], [0215], [0216], [0226], [0236], [0237], [0239], [0240] and [0688].

Moreover, the Examiner states that due to the large genus encompassed by the claims and the allegedly lack of guidance to enable one skilled in the art to make and use the claimed subject matter, one skilled in the art is unnecessarily and improperly left to experimentation which is extensive and undue (Office Action, page 6). Applicants respectfully disagree. As noted above, the specification provides ample guidance with respect to the direction in which experimentation should proceed to determine whether an enzyme exhibits enzymatic activity of an esterase classified in EC 3.1.8 in a coating. Assays for determining enzymatic activity are described at paragraphs [0636] to [0646], [0676], [0680], [0689] to [0698], and [0719] to [0722]. The quantity of experimentation needed to be performed by one skilled in the art is only one factor involved in determining whether "undue experimentation" is required to make and use the invention. "[A]n extended period of experimentation may not be undue if the skilled artisan is given sufficient direction or guidance." *In re Colianni*, 561 F.2d 220, 224, 195 USPQ 150, 153 (CCPA 1977). " 'The test is not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed.'" *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988) (citing *In re Angstadt*, 537 F.2d 489, 502-04, 190 USPQ 214, 217-19 (CCPA 1976)). Time and expense are merely factors in this consideration and are not the controlling factors. *United States v. Telectronics Inc.,* 857 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988), *cert. denied*, 490 U.S. 1046 (1989).

Furthermore, the Applicant traverses the Examiner's declaration that "... it is not routine in the art to screen for multiple substitutions or multiple modifications ..." (Office Action, page 5). On the contrary, screening procedures are customary when testing enzyme activity. Support for such an assertion may be found, for example, in paragraph [0181] of the specification:

> It is also possible to produce a mutant enzyme with an enhanced enzymatic property against a specific substrate by evolutionary selection rather than rational design. Such techniques can screen hundreds or thousands of mutants for enhanced cleavage rates against a specific substrate. The mutants identified may possess substitutions at amino acids that have not been identified as directly comprising the active site, or its binding subsites, using techniques such as NMR, X-ray crystallography and computer structure analysis, but still contribute to activity for one or more substrates. For example, selection of OPH mutants based upon enhanced cleavage of methyl parathion identified the A80V/S365P, L182S/V310A, I274N, H257Y, H257Y/I274N/S365P, L130M/H257Y/I274N, and A14T/A80V/L185R/H257Y/I274N mutants as having enhanced activity. Amino acids Ile274 and Val310 are within 10 .ANG. of the active site, though not originally identified as part of the active site from X-ray and computer structure analysis. However, mutants with substitutions at these amino acids demonstrated improved activity, with mutants comprising the I274N and H257Y substitutions particularly active against methyl parathion. Additionally, the mutant, A14T/A80V/L185R/H257Y/I274N, further comprising a L185R substitution, was most active having a 25-fold improvement against methyl parathion (Cho, C. M.-H. et al., 2002).

For at least the reasons noted above, it is asserted that the specification enables one skilled in the art to make and use the limitations of the present claims. In addition, it is asserted that the specification conveys to one skilled in the art that the inventor had possession of the claimed subject matter and, therefore, the written description requirement is satisfied for the present claims. Accordingly, removal of 35 U.S.C. § 112, first paragraph rejections of the claims is respectfully requested.

Section 103 Rejections

Claims 1, 67, 72-75, 79, 80, 82, 83, 88, 89, 94-97, 103, 105, 110-112, 126-131, 180-182, 217, 252, 319, 320, 323, 324, 343, 351-354, 365, 368-370, 376, 380-385, and 391 were rejected under 35 U.S.C. § 103(a) as being unpatentable over by U.S. Patent No. 5,998,200 to

Bonaventura et al. (hereinafter referred to as "Bonaventura") in view of a paper entitled "*Alteromonas* prolidase for organophosphorus G-agent decontamination", published in Chemico-Biological Interactions, and written by Cheng et al. (hereinafter referred to as "Cheng"). Claims 81 and 251 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bonaventura and Cheng in view of pages 6, 12-19, 127, 165, and 288-290 of *Paints, Coatings, and Solvents, Second Completely Revised Edition* by Stoye et al. (hereinafter referred to as "Stoye"). To establish a *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion or incentive to do so. *In re Bond,* 910 F. 2d 81, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990). Bonaventura and Cheng, taken alone or in combination, do not disclose all limitations of the pending claims, some distinctive limitations of which are set forth in more detail below.

Bonaventura and Cheng, taken alone or in combination, do not teach, suggest or provide motivation to create a paint with an enzymatically active esterase that is classified in an enzyme subclass designated by Enzyme Commission number EC 3.1.8. Independent claim 1 recites: "[a] paint comprising an enzymatically active esterase classified in an enzyme subclass designated by Enzyme Commission number EC 3.1.8." Independent claims 319 and 368 include a similar limitation for a surface treatment and a coating, respectively. Support for the amendments to the claims may be found, for example, in paragraph [0129] of the specification. The Examiner admittedly states on page 8 of the Office Action that Bonaventura does not teach paints comprising an organophosphorus hydrolase. To overcome such a lack of teaching, the Examiner cites Cheng as teaching a variety of liquid compositions comprising organophosphorus acid anhydrolase and surmises that it would have been obvious to a skilled artisan to modify the paints disclosed in Bonaventura by incorporating the organophosphorus acid anhydrolase disclosed in Cheng. Applicants respectfully disagree.

Bonaventura teaches biologically active chemicals (some of which are enzymes, particularly proteases) that are specifically configured to hinder the attachment and growth of bacteria to prevent fouling of an aquatic apparatus. As noted in the response to the Office Action

mailed May 18, 2007, such an objective and enzyme function is completely different from the teachings of Cheng to detoxify OP compounds. Thus, Applicant asserts that it would not be obvious to one skilled in the art to modify the paint described in Bonaventura to incorporate the enzymes taught in Cheng. In response to such an argument, the Examiner acknowledges the specific objective and function of the enzymes described in Bonaventua, but surmises "how the paints of Bonventura are to be used is irrelevant to the instant rejection …" (Office Action, page 9). Applicant strongly disagrees. Ascertaining the differences between the prior art and the claims at issue requires interpreting the claim language, and considering both the invention and the prior art references as a whole. MPEP 2141.02 (underline added for emphasis).

As further noted in the response to the Office Action mailed May 18, 2007, the fact that both Bonaventura and Cheng teach the use of enzymes for their objectives does not substantiate a basis for obviousness. In particular, enzymes by definition refer to substances for catalyzing a chemical reaction and, thus, entail a broad spectrum of applications and specificity. Citing use of a specific type of enzyme (e.g., proteases, as taught in Bonaventura) for a particular function within a specific medium does not necessarily render a different type of enzyme (e.g., prolidases, as taught in Cheng) configured for a completely different function compatible, much less effective, in the same medium. In response to such an argument, the Examiner acknowledges that Bonaventura's use of an enzyme does not render obvious use of an organophosphorus hydrolase enzyme, but maintains Bonaventura's teaching that an enzyme may be incorporated within a paint offers sufficient motivation for one skilled in the art to make and use a paint incorporating the enzyme taught in Cheng (Office Action, pages 9-10). Applicant strongly disagrees for the reasons noted above. Furthermore, the Applicant disagrees with the Examiner's statement on page 9 of the Office Action that if Bonaventura's use of an enzyme rendered obvious use of an organophosphorus hydrolase enzyme, then a rejection under 35 U.S.C. 102(b) would be proper. On the contrary, any rejection based on obviousness has be under 35 U.S.C. 103(a). A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. Of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), MPEP 2131.

Bonaventura and Cheng, taken alone or in combination, do not teach, suggest, or provide motivation to create a surface treatment or a coating with an enzymatically active esterase classified in an enzyme subclass designated by Enzyme Commission number EC 3.1.8 which is capable of exhibiting catalyzing activity in the surface treatment at one or more instances after the surface treatment has been formed with the enzymatically active esterase for greater than approximately 1 week. Independent claims 319 and 368 recite such limitations for a surface treatment and a coating, respectively. As noted on page 10 of the Office Action mailed May 18, 2007, neither Bonaventura nor Cheng specifically disclose that their enzymes are effective for more than one week in the substances described therein. The Examiner, however, appears to surmise that a skilled artisan would believe the enzymes would be inherently so effective in the substances. Such conjecture is respectfully traversed. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristics. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) MPEP 2112. In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristics necessarily flows from the teachings of the applied prior art. *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) MPEP 2112.

As noted in the response to the Office Action mailed May 18, 2007, Cheng teaches that activity of enzymes in the presence of the substances described therein is significantly reduced (up to 50%) after a 24 hour period (*see* Fig. 3 and the first partial paragraph on page 461 of Cheng). There is no teaching or suggestion within Cheng of analyzing the activity of the enzymes within the substances for longer periods of time. Such a short term analysis suggests that substances described therein are intended for near immediate use and, therefore, there is no desire to mix the enzymes within substances for long term enzyme activity, such as greater than approximately 1 week. In the present Office Action, the Examiner refutes such an argument by citing Cheng as teaching the organophosphorus acid anhydrolase taught therein "… can be stable for at least one year when dried in the presence of a buffer, 10% of the activity was retained after a year. Moreover, when dried in the presence of trehalose, 100% of the activity was retained after a year." (Office Action, page 10). Applicant notes that the reference of the year time period

taught by Cheng refers to the enzyme being freeze-dried for a year and NOT to the enzyme being constituted in a liquid medium (i.e., water and/or ammonia carbonate) for a year. Cheng only teaches testing enzyme activity immediately after and only up to 24 hours after constituting the freeze-dried enzyme in a liquid medium, which is a significantly shorter amount of time than the time frame of greater than 1 week as recited in claims 319 and 368. Based on such a distinction, it is asserted that it would not be obvious to one skilled in the art to infer the enzyme activity retention taught in Cheng may be sustained in a liquid medium after a time period of greater than 1 week. Such an assertion is further supported by Cheng's teachings that the activity of enzymes added to the substances listed in Table 2 and Fig. 3 is significantly reduced after a 24 hour period.

Applicant further notes that the teachings in Cheng cited by the Examiner are specific to the use of a freeze-dried enzyme reconstituted with water and, in some cases, further with ammonia carbonate. Such liquid media is vastly different than coating media, such as paint, and, thus, it is asserted that it would not be obvious to one skilled in the art to infer the activity retention recited in claims 319 and 368 in a coating based on such teachings. In response to such an argument, the Examiner cites U.S. Patent No. 4,155,887 to Heston (hereinafter referred to as "Heston") as teaching trehalose as a component used in paints and surmises from such teaching "… paints comprising organophosphorus hydrolase would be predicted to be 100% active for at least a year. In addition, paints not comprising trehalose would be expected to retain 10% activity for at least a year." (Office Action, page 10). The Examiner's interpretation of Heston's teachings as well as the conjecture based thereon are traversed.

Heston teaches employing a polysaccharide containing stabilizer blend in latex paint compositions containing porous solids to eliminate shrinkage of the paint composition in storage without sacrificing application characteristics (column 2, lines 44-48). Heston further teaches the stabilizing blend "… contains from about 20 to about 65% by weight of saccharide … (column 3, lines 7-9), which is preferably "… produces by the fermentation of one or more carbohydrates with bacteria of the genus xanthomonas." (column 3, lines 12-15). Although Heston cites trehalose as a suitable carbohydrate source material for preparing the polysaccharide stabilizer (column 3, lines 24-31), there is no teaching or suggestion within

Heston that trehalose is a component of the latex paint taught therein as erroneously cited by the Examiner. Furthermore, even if (for the sake argument) Heston taught trehalose as a component of paint, such a teaching would not lend one skilled in the art to believe that the incorporation thereof may yield 100% enzyme activity retention (or any percentage for that matter) based on the teachings of Cheng. In particular, Cheng's reference to trehalose affecting enzyme activity is limited to the enzyme dried in the presence of trehalose and stored for a year. There is no teaching or suggestion within Cheng that incorporating trehalose in a liquid medium constituting the enzyme taught therein affects the activity retention of the enzyme. Furthermore, as noted above, there is no teaching or suggestion within Cheng that the enzyme activity retention disclosed therein could be sustained for after a time period of greater than 1 week after a liquid medium is formed with the enzyme.

For at least the reasons stated above, Bonaventura and Cheng, taken alone or in combination, provides no teaching, suggestion, or motivation to render the limitations of claims 1, 319, and 368 obvious. Although Stoye was not specifically cited against claims 1, 319, and 368, it is noted that Stoye does not teach or suggest a coating with an enzymatically active esterase classified in an enzyme subclass designated by Enzyme Commission number EC 3.1.8. As such, Stoye cannot be used to overcome the deficiencies of Bonaventura and Cheng to teach the limitations of those claims. Therefore, claims 1, 319, and 368 are believed patentably distinct over the cited art. For at least the same reasons, dependent claims 67, 68, 72-75, 79, 80, 82, 83, 88, 89, 94-97, 103, 105, 110-112, 126-131, 180-182, 217, 252, 320, 323, 324, 343, 351-354, 365, 369, 370, 376, 380-385, and 391 are also believed patentably distinct from cited art. Accordingly, removal of the § 103(a) rejections is respectfully requested.

CONCLUSION

This response constitutes a complete response to all of the issues raised in the Office Action mailed February 27, 2008. In view of the amendments and remarks herein, Applicants assert that pending claims 1, 15-28, 31-35, 37-52, 55-63, 65-67, 69-75, 79-108, 110-256, 272, 309, 313-359, 361, 362, 365-373, and 376-392 are in condition for allowance. If the Examiner

has any questions, comments, or suggestions, the undersigned earnestly requests a telephone conference.

The Commissioner is authorized to charge any fees which may be required, or credit any overpayment, to deposit account no. 50-1085.

Respectfully submitted,

/C. Steven McDaniel/
C. Steven McDaniel
Reg. No. 33,962
Attorney for Applicant

Customer No. 62754
Date: August 27, 2008